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ABSTRACT

A quantum computer is proposed in which information is stored in the two lowest electronic states of doped quantum dots. Multiple quantum dots are located in a microcavity, and a pair of gates controls the energy levels in each quantum dot. A controlled NOT (CNOT) operations involving any pair of quantum dots can be effected by a sequence of gate voltage pulses which tune the quantum dot energy levels into resonance with frequencies of the cavity or a laser. The duration of a CNOT operation is estimated to be much shorter than the time for an electron to decohere by emitting an acoustic phonon.